

MINING BOOM, STRUCTURAL CHANGES AND THE DYNAMICS OF LABOUR MARKET TRANSITIONS IN BELLARY REGION OF KARNATAKA

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ABSTRACT

The neo-liberal economic policy of structural changes not only improve economic development, but are expected to raise many other development indicators that are necessary for sustaining economic growth. One of the most common consequences of structural change that have been observed historically around the world is a shift in share of GDP from agriculture to industry and then to services. Simultaneously, there will be shifts in the labour market behaviour which needs to be investigated in the context of structural change in India. It has been further observed that within the primary sector, the mining and quarrying activities, which are generally labour intensive, has undergone a significant change owing to the mining boom during the first decade of the millennium. However, natural resource booms create complicated problems in macroeconomic management that are challenging even in economies with good governance and capable institutions, and much more so in economies like India. Such structural changes are expected to include changes in the real wage, labour mobility, shrinking manufacturing sector compared to the natural resource sector and a rise in the service sector. In this paper an attempt is made to fill this gap by conducting a study of the recent mining boom, associated structural changes and the dynamics of the labour market transitions occurred in India in general and Bellary region of Karnataka state in particular. The impacts of recent mining boom in the labour market of the country with a focus on one of the hot spots in mining, viz. Bellary region in Karnataka have been examined with the help of field investigation. The co-integration between the key sectors of the economy have been analysed with the help of different statistical tools to measure the contribution of each sector to the growth and employment and then to understand the impact this structural changes on the households. Finally we have tried to identify the drivers of structural change over the years and to predict the future drivers for the purpose of policy making.

Our results have established that the economy of India and Bellary region have experienced a sectoral shift in share of GDP from agriculture to industry and then to services due to the recent mining boom. However in Bellary the services and mining industries gained relatively more importance compared to the other sectors. The study of the labour market of Bellary shows dynamic growth in employment in mines, as well as in ancillary activities like construction, hotels and restaurants, trade, transport etc. It has been observed that the increased export of iron ore due to the mining boom has strengthened the primary sector of Bellary, the iron ore sector popped during the boom has strengthened the secondary

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sector and has also accelerated the growth of sectors like transport, construction, hotels and restaurants etc, and made a very strong tertiary sector. Contrary to the trend of sectoral transformation in other regions of the country where service sector is growing at the cost of primary and secondary sector, our study of the Bellary region have established that all three sectors are growing simultaneously after the mining boom period, which is a confirmation of the “three speed economic growth model” for the region in conformity of the trend as was observed in developed countries like Australia and Canada.

KEYWORDS: Mining Boom, Structural Changes, Dynamics of Labour Market Transitions in Bellary

INTRODUCTION

Structural changes play a critical role in the process of economic growth of a developing economy and bring transformations in the standard of living of the people. Structural changes not only aid economic growth, but also expected to raise many other development indicators required for sustaining economic growth. One of the most common consequences of structural changes that have been observed historically around the world is the shifts in the share of Gross Domestic Product (GDP) and employment generated from agriculture to industry and then to services, i.e., a shift of employment from primary sector towards secondary and tertiary sectors. In view of the possible shifts in the labour market which have wider ramifications, one has to examine such possible shifts in the context of structural changes in India over time. It is further argued that within the primacy sector, particularly the mining and quarrying activities, which are generally labour intensive, undergo a significant change during primary sector boom, if any. However, natural resource booms generally create complicated problems in macroeconomic management that are challenging even in economies with good governance and capable institutions. Such structural changes include stagnating manufacturing sector compared to natural resource sector and a growing service sector, which are expected to influence real wage and labour mobility. In view of very few studies available in dealing with mining boom's impact on labour market and labour mobility in India, in this paper an attempt is made to examine such changes by conducting a study of the recent mining boom, associated structural changes and the dynamics of the labour market transitions that occurred in India in general and in a typical region, namely, Bellary of Karnataka state in particular, which is one of the hot spots in carrying out mining and quarrying activities in the new millennium. The justification to choose Bellary region is based on the fact that while Karnataka contributes about one-fourth of the country's annual iron ore production, around 60 per cent of this comes from the Bellary region, which is situated on the eastern side of Karnataka State and shares its border with Andhra Pradesh.

Accordingly, we have set our objectives in terms of examining the impact of recent mining boom on the labour market with a focus on one of the hot spots in mining, viz. Bellary region in Karnataka. The main aim of this study has been to examine the structural change owing to mining boom and its impact on the labour market as well as labour mobility in a typical region of the country with particular reference to the impact on primary sector, secondary sector like mining based industries and the services sector.

To accomplish these objectives, the focus of this study has been two-fold: to understand the labour market changes in recent years in backdrop of the mining boom, and to gauge the performances of households in relation to these structural changes. Furthermore, with the help of various theories of structural change, we have examined the validity and significance of the widely held view that economic progress is generally associated with certain distinct, necessary and predictable changes in occupational distribution, i.e., in terms of movement from primary sector to tertiary activities.

The relationship of each of these sectors to growth and employment are investigated in terms of extent of shift,

flexibility and elasticity of the labour market; the drivers of structural change over the years and the expected changes over the next decade. We have also investigated the cointegration between these sectors and the contribution of each sector to the growth and employment. By utilising the primary survey data collected from the typical area of the country, the impact of the mining boom and resultant structural changes on the households over the period of mining boom and non boom are estimated with the help of quantitative techniques.

THEORIES OF STRUCTURAL CHANGES

The causes of structural transformations have been widely debated and there are varied emphasis laid on different factors by different economists. The main broad line of reasoning was advanced by pioneers like Fisher and Clark followed by some elaborations and modifications by later economists. Allen Fisher (1939) was the first economists to investigate structural changes. Fisher divided economy into three broad sectors, viz, the 'primary sector' comprising of mainly natural resource based sectors including: agriculture, fishing, mining, quarrying, and forestry; 'secondary sector' comprising of manufacturing, electricity, gas, water, construction and housing; finally the 'tertiary sector' includes service oriented activities mainly composed of wholesale and retail trade, hotels and restaurants, transport and communication, finance, real estate, and government services. Through his study, Fisher had demonstrated that the structural change was there due to the saturation of demand for manufactured goods and high income elasticity of demand for services. Clark (1940) agreeing with Fisher's view later added that the shift of labour force takes place due to productivity differences of these sectors.

These arguments were developed into the Fisher-Clark 'three-stage' theory of growth. On the other hand, Kuznets (1957, 1966, and 1971) had recognised the elasticity and productivity approaches and further added that the technological as well as institutional factors also play an important role in accelerating these changes. The response of structural change would vary depending on the trade openness of a country and also on their comparative advantages. Stephen Broadberry (1998) had conducted a quantitative shift share analysis and concluded that Germany and the United States overtook Britain in terms of aggregate labour productivity largely by shifting resources out of agriculture and by improving comparative labour productivity in services rather than by improving comparative labour productivity in manufacturing.

The process of economic growth and development thus is connected with systematic structural change. As per capita income rises, the primary sector loses in importance, while the manufacturing sector initially gains momentum but eventually surpassed by the constantly growing service sector. This trend is observed all over the world and the service sector is becoming the largest sector in terms of rising share in GDP and employment in most developing countries. However, the services sector in these countries is highly diverse and is increasingly seen as a means to promote economic development and reduce poverty. From the perspective of social sustainability it is also worth recalling that some services like education, health and social services directly affect the standards of living.

As regards the recent natural resource booms, it is observed that these booms have created complicated problems in macroeconomic management. Such structural changes are expected to include changes in the real wage, labour mobility, shrinking manufacturing sector compared to the natural resource sector and a rise in the service sector. In order to study the impact of boom on the sectoral changes, Corden and Neary (1982) had typically modelled the economy into three sectors; i.e., the natural resource sector, the tradable sector (usually understood as agriculture and manufacturing), and the non tradable sector (including services and construction). Though we have adopted this model in our study, we have fine tuned it by keeping the iron ore resource boom of a typical region in mind. The framework we have adopted is a small open economy producing two goods which are traded at exogenously at given world prices, and a third non-traded good,

the price of which moves flexibly to equalize domestic supply and demand.

In principle, economic activity and growth can foster improvements in social conditions by direct creation of jobs, with corresponding flows of income and wealth accumulation. Economic growth may also allow more resources to be used for social services such as, health, education and welfare, both through private and public spending in turn increasing community liveability. Since our study has attempted to examine the impact of mining on sustainability, first of all we have hypothesised that as a result of mining boom there will be injections of economic stimulus into the regional economy with dominance of mining and it will help to maintain regional employment. It will result in spread effects and those effects can be summarised as:

- The ***Spending Effect***, where increased domestic income flowing from the booming natural resource sector would generate higher spending opportunities on domestic goods, leading to higher prices of goods and higher output in the non-tradable sector. Wages in the economy would tend to rise, and thereby squeezing profits in the internationally tradable sectors, such as, manufacturing those are not based on natural resources. With increased inflation in non-tradable prices, there would be an appreciation of the real exchange rate and an output contraction would take place in the non-resource-tradable sectors like manufacturing.
- The ***Resource Movement Effect***, which takes place when a boom in the natural resource sector attracts capital and labour from other parts of the economy, tending to reduce output in the rest of the economy. In particular, reduced output in the non tradable sector causes the price of non tradable to rise relative to those of tradable, whose prices are set in the world market

MINING BOOM IN INDIA IN THE NEW MILLENNIUM & STRUCTURAL CHANGES

In the wake of the new millennium, the commodity sector, particularly the mineral resources in India had experienced an upswing owing to massive economic expansion both in China and in India. There had been increased demand and consequently the levels of prices of several commodities, including oil and metals and alloys like iron, steel, aluminium, etc had gone up. As we know that in a natural resource owned economy like ours, mining occupies a paramount place in enhancing the GDP as well as employment. In the wake of the new millennium, mining that constitutes the basic feedstock for industrial growth in India had experienced a boom in the last decade. In fact, two factors paved the way for the mining boom; a) changes in India's mining policy in 1993 by which land meant exclusively for mining by public sector units were de-reserved for private entities, and b) the increase in the demand of mineral resources, specially iron ore by China. China began importing huge quantities of iron ore to prepare for the 2008 Olympic Games, as a result of which the price of iron ore soared from Rs. 1,200 per tonne in 2000 and crossed Rs. 5,000 per tonne in 2003 and again to 6000 in 2006 (of course, the price of iron ore in world market grew 118.5 % between 2002 – 2005) and the rates hovered around 6,800- 7,000 by 2008

India with its significant reserves of iron ore (25 billion tonnes) had emerged as a major exporter taking advantage of the burgeoning Chinese demand. Exports of iron ore from India increased from 50 million tons in 2002 to more than 117 million tons in 2009 (details of export are given in Table 1). Indeed, India had emerged as the 3rd largest exporter of iron ore next to Brazil and Australia. Almost entire iron ore production in India can be attributable to hematite ore, compared to magnetite.

As per available statistics there were 319 iron ore mines in 2010 with an estimated cumulative production capacity

of 350 million tons per annum. With the iron ore boom, India emerged as one of the leading iron ore exporters in the world and China became the largest importer. Country wise exports of India during 2005-06 to 2010-2011 are shown in table below.

Table 1: Export of Iron Ore from India (2005-2010) (In Million tons)

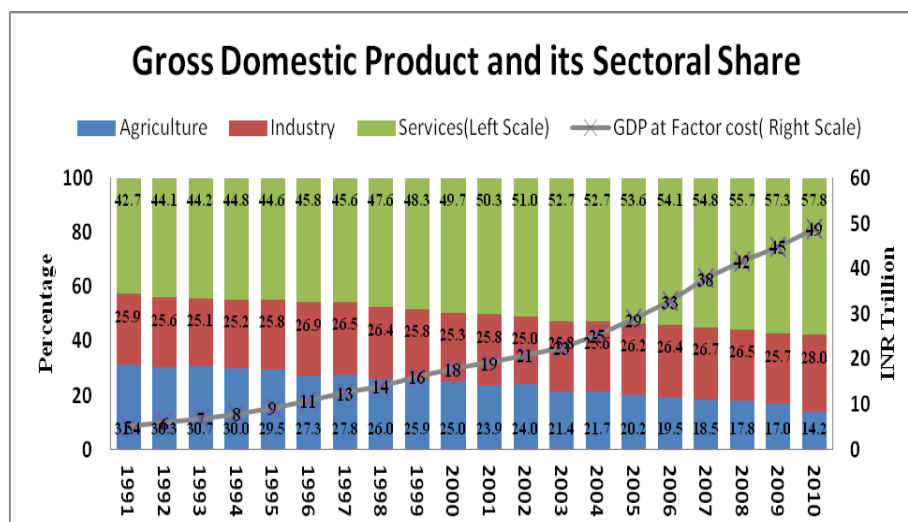
Country	2005	2006	2007	2008	2009	2010
China	74.13	80.16	91.8	97.85	109.3	89.72
Japan	10.33	8.63	7.7	5.43	5.87	5.44
South Korea	1.32	1.91	1.76	0.99	1.32	1.51
Europe	2.1	2.07	1.62	0.76	0.72	0.67
Others	1.25	1.02	1.21	0.84	0.17	0.3
Total	89.27	93.79	104.27	105.87	117.38	97.66

Source: IBM, 2011.

An analysis of the export trend from India reveals that it had exported a significant tonnage of iron ore during the iron ore boom period with a peak of 117.38 million tonnes in 2009 but dropping sharply to 97.66 million tons in 2010 because of a ban on exports imposed by Karnataka government to contain environmental concerns, rampant corruption and also due to imposition of uniform 20 percent export duty. The export ban in Karnataka led to 20.6 percent decline in exports of iron ore in 2011. This export trend led to a tightening of iron ore prices in international market and the price increased from US\$ 124/ton in July 2010 to US\$155/ton in August 2010. All these developments have brought structural changes in the Indian economy.

- **Structural Changes in India**

An examination of the structural changes in India has revealed that economic development and labour force engagement in different sectors of India have followed the same pattern of structural changes as of the developed economies. The share of agriculture in GDP in India has declined from around 60 per cent in 1950-51 to 14.2 per cent in 2010-11. That of industry increased from 13 to 28 per cent and of services increased from 28 to 57.8 per cent. Though the pattern of shifts has been continuous throughout the period of over half a century, but the speed of the shift has been faster since 1990-91, which is depicted in figure below.



Source: Planning Commission, Government of India, 2010

Figure 1: Sectoral Contributions to GDP in India in the Post Reform Period

IMPACT OF THE BOOM IN A REGIONAL ECONOMY: A CASE STUDY OF BELLARY REGION IN KARNATAKA

In order to study the impact of structural changes on a regional economy, we have adopted the following methodology:

Methodology Adopted to Gauge the Impacts

To accomplish the objectives of the study we have adopted an empirical approach for which a suitable region, viz., Bellary in Karnataka was selected and extensive data were collected both from the secondary and primary sources during 2008-2010 by undertaking field visits to the study area. Most of the data of mining activities have been extracted from reports of Bureau of Mines and various EIA reports submitted by the mining lease holders to MOEF, Government of India. With a view to assess various aspects of structural change, we have formulated some criteria and methodology by critically reviewing the existing methodologies. The literature reveals that it is difficult to capture all the effects with the help of a single measure. To overcome such problems, with the help of secondary data, we have used Chow test to confirm the structural change along with time series techniques, productivity, and employment elasticity. Various ratios and regression techniques are employed by using statistical softwares like E-Views 5 and Strata 11. All those indices are cross compared over the periods of time to capture the effect of the boom. Vector Auto Regression (VAR) has been used to analyse the responsiveness of each sector to the shocks.

To accomplish a meaningful comparison of the secondary data utilised in our analysis, the statistics /data collected in the current prices have been converted into constant prices by adopting a deflation procedure with the base of wholesale price index (WPI) data of 1993-94. Those price indices have been downloaded from the website of the Office of the Economic Advisor to the Government of India, Ministry of Commerce and Industry. The other secondary sources are the Directorate of Economics and Statistics, Government of Karnataka, the National Sample Survey Organisation (NSSO), Labour Department of Karnataka and India, Economic Census, Economic Survey, District websites etc.

Moreover, in order to examine the impact of the boom on households, primary data have been collected from six different villages of Bellary-Hospet-Sandur belt comprising of 5 villages of Bellary district of Karnataka and one village of Anantapur district of Andrapradesh. The required primary data have been collected from the field by developing a comprehensive interview schedule. With the help of those primary data, we have analysed the trend of income, consumption, savings and assets possessed by households for cultivators, agricultural labours, mining labours, and people engaged in services and the other workers across three periods, viz. before mining, during the boom and post boom period. Various ratio analysis and relative changes in percentage terms have been used for a comparative analysis.

Using these methodologies, the study has explored and assessed the structural changes due to mining in the Bellary region. The structure of the labour market, and structure of industrialisation are investigated in order to formulate proper policies to assist sustainable development. The rapid changes in the employment patterns are analysed to portray the existing socio-economic condition and status of labours in the context of the changing developmental scenario of Bellary region.

Physical and Socio-Economic Features of Bellary Region

Bellary region, located on India's southern plateau, is blessed with fertile soil and minerals. It is situated in the northern dry agro-climatic (arid) zone of Karnataka and has a total geographical area of 8420 sq. km. (8, 45,000 hectares), constituting 4.99 percent of the area of the State. Forest area covers 1, 37,852 hectares of the geographical area (i.e., 16.3 per cent) of the region. Bellary having an arid climate also comes under hottest region in the state of Karnataka. It is known for its blistering summer and dry weather for a major part of the year. The region is drought prone and has been afflicted by famine in the past. Furthermore, the black cotton soil of the region has a tendency to break and leave large cracks during summer and it make hard even grass to grow.

- **Demographic Features of Bellary Region**

Official Census of India, 2011 details Bellary's population as 2,532,383, of which male and female are 1,280,402 and 1,251,981 respectively. It is observed that there is change of 24.92 percent in the population compared to 2001. In the previous census of India 2001 also, Bellary recorded an increase of 22.41 percent to its population compared to 1991. Density of population of Bellary also increased in 2011 and recorded 300 people per square km. against 240 per square km. in 2001. Average literacy rate of Bellary in 2011 has improved to 67.85 compared from 57.40 of 2001. The male and female literacy of the region improved to 77.24 and 58.28 respectively as compared to 69.20 and 45.28 in 2001. With regard to sex ratio in Bellary, it stood at 978 per 1000 male compared to 2001 census figure of 969. Out of the total Bellary population for 2011 census, 36.30 percent lives in urban region.

- **Socio Economic Conditions of Bellary Region before Mining Boom**

Bellary, a land-locked region, located 304 kilometres away from the capital city, of Bangalore in Karnataka state and shares its border with Andhra Pradesh. Archaeological explorations show that it is a region inhabited from time immemorial. The region has witnessed troughs and crests of economic well being over age's, viz., its splendour during Vijayanagara Empire and economic downturn after its downfall until minerals were explored in the region.

Bellary in its present administrative structure was formed in 1997, when some of the taluks were made part of Andhra Pradesh which was formed on linguistic basis. At present the region comprises of seven taluks, viz., Bellary, Hospet, Sandur, Siruguppa, Kudligi, H.Hadagali, and H B Halli. In spite of having rich mineral resources, Bellary region

was known as one of the backward areas of Karnataka. As a result of skewed development, Bellary remained as one of the backward regions of Karnataka, ranking 18 among 27 districts in terms of human development in 2001 (HDR, GoK, 2006). Until the period of mining boom (2003-2008), agriculture was the major occupation of Bellary region, providing livelihood for 67 percent of the labour force. But geographical and climatic conditions of Bellary were not so friendly for agricultural development. The rainfall is not only scanty but also capricious and uncertain; the variations in the annual rainfall from year to year are very large. Due to the scarcity of rains and lack of proper irrigation facilities, agriculture in some taluks, particularly the western parts has been severely affected. Moreover, excessive salt content in the soil has resulted in poor yield and made the area unsuitable for good irrigation.

- **Mines and Minerals Sector of Bellary before the Boom**

Increase in the mining activities in the area has a remarkable development. It has imparted special significance in the economic life of the people and contributed considerably to raise total income of the State. Bellary region slowly earned its name for its exports of agricultural and mineral produce. The principal trade is related to cereals and millets which are largely grown in the area. The rich black cotton soil in the eastern part of the region with irrigation facilities from Tungabhadra project accounts for the growth of cotton trade and subsequently promoted a large number of cotton-ginning factories. Bellary region also exports groundnut, jaggery, garments carpets, blankets along with iron and manganese ore.

Mining is now the emblematic trait of Bellary as the region is well endowed with wide variety of minerals, both metallic and non-metallic out of which iron and manganese are major ones. The metallic minerals include iron, manganese, red oxide, gold, copper and lead. The non-metallic minerals include asbestos, corundum, clay, dolomite, limestone, graphite, moulding sand, quartz, satellite, soap stone, granite yellow ochre, red ochre, decorative and ornamental stones. The metallic minerals especially iron ore is abundant in three taluks, viz., Sandur, Hospet and Bellary in the order of their mining intensity.

Bellary region witnessed mining for decades and iron ore reserves found in Bellary, Hospet and Sandur regions in Karnataka have a mining history of over 100 years. Mining activities were undertaken on a very small scale right from 1800's by British government and earlier to that by local kings for their weaponry and other domestic products (www.mmpindia.org). But the commercial exploitation of iron ore started in 1906 with the mining license granted to G.S.M. Company that continued the mining operation till 1953. However, iron ore production by the state and private mine owners started in 1953 and the Bellary district mine owners association was established in the same year with an initial membership of 42 members (www.bellary.nic.in). Till a decade ago, mining companies of the region were struggling with small profits due to low iron ore price both in domestic and international markets. However, mining activity began to be considered an important economic sector since 1995 when Government owned National Mineral Development Corporation (NMDC) started its exploration activities along with the increased domestic demand from Jindal Steels Works (JSW) that started their steel plant at Toranagallu in Sandur taluk of Bellary. Further, in the turn of the present century the export demand from China, Korea and other countries gave a boost to the iron ore production.

To sum up, the economy of the region is sustained primarily by the intensive use of agricultural land, exploitation of minerals, agro based industries, garment, iron and steel, manufacturing related large scale industries. Trading and commercial activities also have a stabilising effect on the region's economy because of the good transport and communication system.

Analysis of the Structural Change in the Bellary Region

Before examining the structural changes in the Bellary region, we have analysed the structural changes that have taken place in the state of Karnataka. In tune with the national trend, Karnataka's economy has exhibited structural changes over the years. When the State was formed in 1956, its economy was predominantly agrarian, but this has now altered. The primary sector, which contributed about 60 per cent of the GSDP in 1960- 61 has reduced to 18.9 per cent in 2006-07. In the same period, the share of secondary sector has increased from 15.2 per cent to 26 per cent and the share of tertiary sector has more than doubled from 24.8 per cent to 55.1 per cent. The mining boom followed by service sector boom since the 1990s has boosted the State's economic growth. The manufacturing sector which lagged behind for some time has grown well due to mining boom but it has remained steady.

As regards the impact of the boom on Bellary region, analysis of the secondary data collected from the field has revealed that mining boom has brought structural changes in the region. It has raised the Net District Domestic Product (NDDP) of Bellary from Rs.33, 032 million, and per capita NDDP of Rs.15, 770 in 2003-04 to Rs.9, 19,799 million (i.e., more than 26 times rise in NDDP) and Rs.41, 857 (170% rise) in 2007-08 respectively. In contrast to the state level trend, the sectoral contributions of NDDP has undergone a significant change. The primary sector's contribution which was 60.6 % in 1960 came down to 19.76% in 2003. But with mining boom its share has gone up to 35.11% in 2010. On the other hand, the secondary sector's share increased from 14.8 % in 1960 to 35.94% in 2003; however, by 2010 its share declined to 23.16%. The tertiary sector has steadily increased from 24.6% in 1960 to 45.21% in 2003 and slightly declined to 41.73% in 2010.

It is further established that mining boom and the resultant structural change experienced by Bellary are different from the national and state scenario. It has shown that all the three sectors of Bellary have grown over time till the export boom to China. It can also be seen that the tertiary sector has grown consistently and the primary sector growth is related to the mining boom in 2003. The secondary sector also started growing when the trickledown effect of the mining prompted the sector in the form of iron and steel industries and sponge iron firms. To find out the significances of each sector to the NDDP of Bellary over the years, we have conducted an ordinary linear regression by using the times series data of the last decade. We have converted it to a log form to find out the growth. The regression results are as follows:

$$NDDP_t = 0.06069 + \underset{(-4.36) (0.001)}{1.001} P_t + \underset{(4.28) (0.003)}{0.85} S_t + \underset{(-5.87) (0.002)}{1.05} T_t$$

$$R^2 = 0.9995, \bar{R}^2 = 0.9979$$

Figures in the parenthesis are t- values and p>|t| values respectively. The results show that the tertiary sector contributes more to the NDDP followed by the primary and secondary sectors respectively. Again the interesting point to be noted is that even after the boom and the resultant structural change, all the sectors of Bellary are contributing positively to its income. This is different from the state and national trend where the share of primary sector has declined significantly with a near stagnant manufacturing sector and a rising service sector.

- **Impact of Boom on Mining and Mineral based Industries**

As mentioned above, Bellary is endowed with rich natural resources both metallic and non-metallic mineral deposits. As per estimates in 2008, the iron ores with a capacity of 1,000 million tonnes in the region were considered to be among the highest grades in the world. At present there are 99 mining-leases of which 63 are operational and 33 mines are

not in operation either because of want of licence from the Forest department or their licence has not been renewed. There are three mines operating by the government enterprises including MMTC. Owing to mining boom, iron ore production of Bellary has increased from 1.2 million tonne in 2000 to more than 42 million tonnes by 2010. In 2004-05 mining and quarrying industry showed an impressive compound average growth rate (CAGR) of 11.29 percent and Bellary's share in the Net State Domestic Product (NSDP) reached 4.8 percent in the same period, ranking it fifth among all districts.

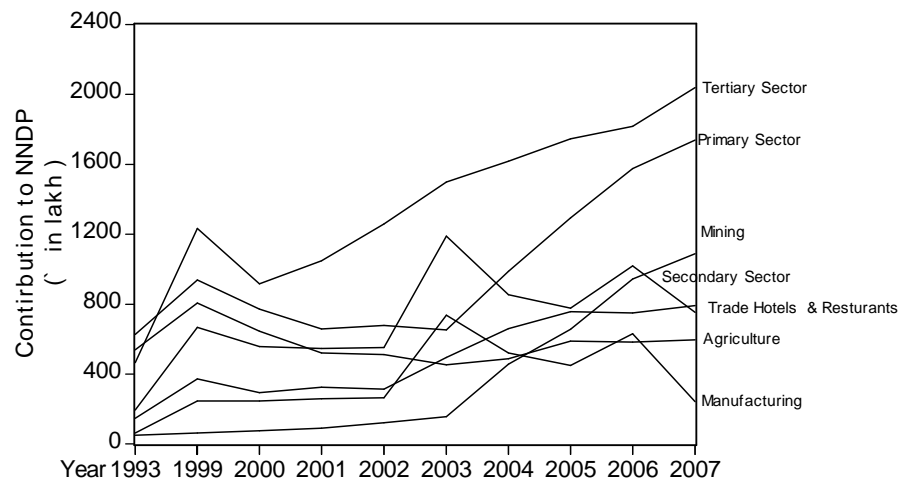
Bellary region has become famous for the presence of a large number of iron and steel industrial units. Presently Bellary has a total of 48 registered units under large and medium scale units and 27 sponge iron units. In addition to the iron ore related units, Bellary has other traditional industries like textiles, sugar and alcohol etc. Bellary is also famous for its textiles especially jeans production. In fact, one-fourth of Bellary's district income comes from registered manufacturing units.

However, Bellary is facing a period of increased structural change with a rapidly changing external as well as domestic environment. Particularly, in recent years both services and mining industries gained relatively more importance in the structural changes. Earlier when Bellary was one of the most backward districts in Karnataka state, now the city of Bellary is the second fastest growing city in the state after Bangalore. But with the collapse of agriculture owing to recurring drought and with mechanization of agriculture, the landless agricultural labourers have been forced to look for other means of wage earnings in the mid 2000s. The farm labourers started working with mining companies which offered them higher wage up to Rs. 250 per day. Due to rapid growth of mining activities Bellary has seen dynamic growth in employment in mines, as well as in ancillary activities like construction, hotels and restaurants, trade, transport etc. The shift in employment from manufacturing toward mining and services reflects the emergence of those economies underpinning the resources boom. Thus, the mining industry has impacted development in Bellary in various ways: Dependence on extraction and export of iron has made the primary sector strong; the iron ore based industries popped up and strengthened the secondary sector. The growth in the mining sector also accelerated the growth of sectors like transport, construction, hotels and restaurants etc, made a very strong tertiary sector. Our primary investigations revealed that the economy of Bellary during the Chinese boom and after followed similar pattern of structural change as observed in the mining giant Australia. Indeed, Bellary has experienced a three speed growth both in income and employment patterns with service sector going up, manufacturing sector growing steadily and the primary sector also growing because of the increased share in the mining and construction sector growing up. In view of these changes it is pertinent to examine the sustainability of the three speed growth model for Bellary.

• **Sector Wise Analysis**

A further segregation of the major sectors and their analysis has revealed that one-fourth of Bellary's income comes from registered manufacturing industries which include textiles and allied steel industries. Particularly, the privilege enjoyed by these allied steel industries is due to the boom experienced in the mining sector. Mining's contribution to the district's Net Domestic Product in 2008 was 8.1 percent compared to 0.86 percent for the whole of Karnataka. An examination of the sector- wise contribution to the NDDP in 2008 shows that the major contributors to the economy are registered manufacturing (25 percent), trade, hotels and restaurants (17 percent), agriculture (12 percent), other services (9 percent) and mining (8 percent). The point to be noted here is that, even though the contribution of mining to the NDDP is 8 percent, apart from the agricultural sector all the other sectors are highly dependent on the mining sector. Hence,

mining still is the backbone of the economy of Bellary. The growth and contribution of these sectors over the years are presented in the figure below. The trends in the graph have established that both tertiary and primary sector have grown consistently after 2003. But the manufacturing sector has exhibited a fluctuating trend.



Source: Calculated from statistical data of DES, GoK

Figure 2: Major Contributors to the NDDP of Bellary over 1993-2007

With a view to confirm that these sectors are the major drivers of the economy of Bellary over the years, we segregated the major three sectors into eighteen and then these are regressed on the NDDP and the significant ones are retained. The results of the regression analysis have established that Agriculture (A), Mining (M), Registered Manufacturing (RM), Trade Hotels (TH) and Other Services (OS) are statistically significant and they are the major contributors of income in Bellary over the years. Then these variables are further regressed on NDDP to find out the each of their relative contributions and the results are given below:

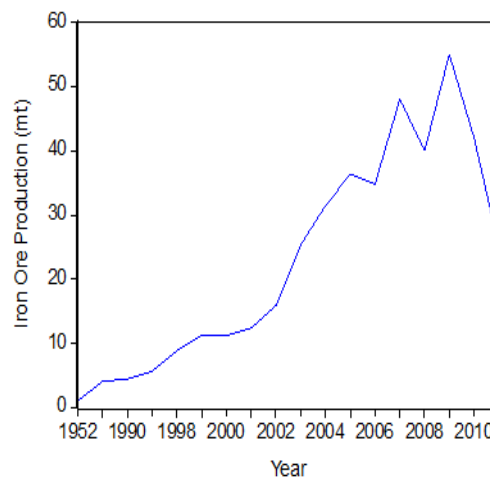
$$NDDP_t = -496.55 + \frac{1.84}{(2.37) \quad (0.0335)} A_t + \frac{2.28}{(-4.36) \quad (0.001)} M_t + \frac{1.36}{(3.057) \quad (0.0184)} RM_t + \frac{0.74}{(4.286) \quad (0.003)} TH_t + \frac{1.48}{(2.37) \quad (0.0335)} OS_t$$

$$R^2 = 0.9945, \bar{R}^2 = 0.9891$$

The above regression results reveal the true nature of the economy of Bellary. Mining contributes the most to the NDDP and it is followed by agriculture implying that agriculture still contributes significantly to the economy of Bellary. Registered manufacturing units are another major contributor of the income. From the results it is also evident that if the two segments of the service sector are combined, it would be contributing more than the primary sector. This result also reconfirms the aforementioned three speed economic growth model for the region.

• Industrial Growth and Iron Ore Production Trends during the Boom Period

Bellary region with its relatively superior quality of iron ore had produced one third of the iron ore exported during the boom period. It exported around 40 million tons of ore every year since 2004 to 2010 (Lokayutha Report, 2011). During 2008, when India exported 70 million tons of iron ore, Bellary's share was 23 million tons, i.e. 33 percent of India's total iron ore exports (IBM, 2009). The quantity of ore that was mined in this region in the last six decades are shown in the graph below, which indicates that the production during the boom period was more than what was mined during the previous five decades.



Source: Our own compilation

Figure 3: Iron Ore Production of Bellary Region

The above figure shows that the mining boom in Bellary resulted in higher production of iron ore since 2002 and reached its highest level of more than 50 million tons in 2009. But production has moved through turfs i.e., it is not a steady rise. During the boom period Bellary produced on an average of 35 million tons of iron ore annually, which was more than 80 per cent of Karnataka's total average annual production of 42 million tons, out of which around 10 million was consumed locally. But data show that the entire production and dispatches of iron ore concentrated in three zones, viz., Hospet, Bellary, and Sandur by around 50-odd operating leaseholders (lessees), who had earned a total profit of around Rs 3,000 to 3,500 crore during the financial year of 2007 (Frontline, 2008).

As regards the industry scenario of Bellary region available data show significant changes after liberalisation of our economic policy in 1991 with relatively higher growth since 1999. With the development of indigenous low cost coal based sponge iron making technologies along with the increased mining resulted in the mushrooming of sponge iron plants in Bellary. In fact, at present Bellary region has 33 sponge iron plants. Further, the region has become famous for the presence of a large number of iron and steel industries and these industries are clustered in the Vijaynagar region of Hospet with JSW the one of largest private steel manufacturing plant in India, followed by Sathavahana Ispat Limited (the first Pig Iron plant setup in the region), Kirloskar's Pig Iron plant, Mukund Steels and Kalyani Steels. In addition, the Bellary Steel and Alloys Ltd. (BSAL) plant is located toward east of Bellary. It is estimated that the inflow of investment into these industries would be around Rs 30,000 crores.

Moreover, in order to provide a boost to industrial development of the region, the Karnataka Industrial Area Development Board (KIADB) has developed five industrial estates along Ananthapur Road, Hospet Road and Bangalore Road. These estates are spread across an area of 429.93 acres and as on 2009 they have promoted 331 units. There is a proposal by GoK to establish Textile Park in Bellary for which the KAIDB has already acquired 150 acres of land in Guggarahatti village in Bellary taluk. The main objective of the park is to improve the quality and make Bellary known as a jeans city not only in India but also internationally. Already Government of Karnataka has set up Textile centre in the region to test the quality of fibre used by Jeans manufacturers and ensure that end products are of good quality and international repute. Data compiled from various sources also indicate that the pattern of economic growth of Bellary has resulted in an explosion in informal and unorganized sector employment through the mining or related sectors like transportation and construction. The mining sector has also attracted a large number of migrants, who have come in search

of jobs and better wages. The industrial profile along with employment statistics in the organised sectors of Bellary over the years are given below in table 2

Table 2: Major Industrial Profile of Bellary Region over the Years
(Figures are Number of Enterprises Other Than the Last Row)

Types of Enterprise	1999	2000	2001	2004	2005	2007	2008	2009	2010
Textiles	47	37	45	49	47	45	43	43	44
Chemical	5	4	5	12	12	16	14	13	13
Engineering	21	15	21	38	38	12	4	6	6
Sugar factories	2	2	2	2	2	2	2	2	2
Iron & allied steel	181	146	161	<u>194</u>	<u>221</u>	<u>78</u>	<u>304</u>	<u>334</u>	<u>378</u>
Total	254	202	232	253	320	338	348	353	397
No. of Employees	19667	18667	19667	22789	25507	27635	30869	32928	37425

Source: Our Own Primary Source

Analysis of the figures clearly shows that the iron and allied steel industries which is the backbone of the region has increased considerably during the boom, of course with a fluctuating trend. In 2009-10 the total number of enterprises in Bellary was 397, which had provided employment to 37, 425. In order to cater to the needs of all these enterprises there number of unorganised units engaged in trade and hotels was 2155, which were employing a large number of semi skilled and unskilled workers. In view of the rapid growth of industries and other allied sectors, the workers profile had undergone a significant change. Today, the percentage of non agricultural workers constitute more than two-third of the total workers in the region.

Analysis of the figure in the table further reveals that since cotton is grown extensively in the region, there are a number of cotton-based units like textile in the area; however, its growth trend has remained more or less steady. The number of textile units which was 47 in 1999, went up to 49 in 2004 and by 2010, its number has slightly reduced to 44. In addition to these organised textile units employing a number of workers, around 500 Stitching units are there in Bellary. The Garment Manufacturing Association had estimated that around 20,000 people are employed through 700-800 micro units having an in-house set-ups. Furthermore, large scale cultivation of groundnut and sunflower have paved the way for development of oil based industries. There are 45 oil extraction units operating in the area. Analysis of the data collected from the District Industries Centre, Bellary for 2005-06 indicate that in the Bellary region there were 12655 small and tiny industries providing employment to 60368 persons. In addition, there are around 50 washing and dyeing units employing about 2,500 workers. However, a majority of these workers are women. In addition the fishermen population was around 41780 in the district out of them 12407 people were full time active fishermen. There were about 1803 farmers practicing Sericulture activities in the district. The available statistics show that most of these industrial units are concentrated in Bellary, Hospet and Siruguppa because of better infrastructural facilities and better linkages.

Moreover, with a view to further promote industrial and economic growth of the region, Karnataka Power Corporation Ltd. (KPCL) has established Bellary Thermal Power Station (BTPS) of 500 mega watts at Kudatini in 2007. The State government further formed a separate authority named as Vijayanagar Area Development Authority (VADA) to develop India's best industrial hub for steel, mining, township, centres of recreation and ancillaries with a massive investment of ` 80,000 crore. The hub is planned for the benefit of villages, of Bellary, Hospet and Sandur. The project, envisages regional economic prosperity of ` 50,000 crore annually, with 2, 00,000 beneficiaries (vada.gov.in).

Because of these economic activities associated with mining, the Bellary region has now transformed from one of the most backward region in Karnataka state to second fastest growing area after the state capital Bangalore. With the iron ore mining boom, there has been a big rush of industrialists, traders, transporters, miners and labourers from far and near to Bellary region. The three-year drought that lasted till 2005 also brought thousands of agricultural workers from villages in Karnataka, Andhra Pradesh, Tamil Nadu and even parts of Maharashtra to work in mines. Bellary in a sense also supported its neighbouring regions; there were large migrants from the poor neighbouring regions like Raichur. At present, town of Bellary is an important trade, industrial and educational centre in the state of Karnataka. The region, which has a population of around two million, became rich enough in terms of Per Capita Gross District Domestic Product, which is Rs 53,289 at current prices, well above the average per capita income of Karnataka.

Labour Market Dynamics of Bellary

After analysing the sectoral distribution and dynamics of structural change of the economy of Bellary, we have analysed its impact on the labour market. Though such exercise is always constrained due to non availability of a consistent time series data, an attempt has been made to collect all relevant information from the published and unpublished materials, by undertaking personal visits to various departments, holding discussions with the local knowledgeable persons and with the officers in the field as well as with other stakeholders. The population census data of 1981, 1991, and 2001, and Economic Census of 1998 and 2005 are used by us in addition to publications and records of the Department of Industries and Commerce, District Employment Exchange, Labour department and that of Bellary Urban Development Authority (BUDA).

Analysis of those data have revealed that though tertiary sector is the major contributor to the net district domestic product but the labour market is primary sector oriented. Agriculture continued to be the mainstay of employment although employment levels in this sector are gradually decreasing. Agricultural labour, accounts for 40 per cent of the rural population and nearly 60 per cent of these is women. It is observed that there is considerable decrease in cultivators during the last two decades, indicating more and more drift towards non-agriculture activities. For a better understanding of the contribution of labours from the each sector to the net domestic product we conducted a regression analysis by using net district domestic product as the dependent variable and the growth of workforce in each sector as the independent variables and obtained the following results.

$$NDDP = 2.35 + \underset{(0.04)}{0.04 P} + \underset{(0.003)}{0.09 S} + \underset{(0.026)}{0.13 T}$$

$$R^2 = 0.8563, \bar{R}^2 = 0.7432$$

From the above results it is evident that the service sector is the major contributor of labour market in Bellary over the years, followed by secondary sector and primary sector respectively. This implies that once prominent primary sector workforce which was mainly agriculture dependent is losing its importance and the workforce is gradually moving to secondary and tertiary sector as well as to mining activities over the years utilising the boom created structural changes.

- **Labour Market in the Mining Sector**

Mining activities being labour intensive generates a lot of employment opportunities directly and indirectly. Indeed, the indirect linkage multiplier effects of mining are likely to be more significant owing to more spread effects. As regards the direct employment in the organised sector, the Regional Labour Commissioner (Central) of Bellary who

keeps accounts of those sectors had estimated in 2006 that the 50 functional mines had employed around 8000 regular male workers in the region. But it is reported that the actual figures were higher than this estimate when one takes into consideration the employment in illegal mines, at stockyards, loading points, trucks, tippers and other machinery. According to an estimate by a labour union, there are 20,000 workers involved in mining work in the region with 5432 permanent workers both in public and private sector mines. On the other hand, unofficial estimates claim that around 1.5-2 lakh people are attached to allied industries like steel mills, sponge iron manufacturing facilities, transport sector and hundreds of heavy vehicle workshops.

But as we know that mining activities are generally undertaken for about eight months in a year as the mines are closed down during the monsoon season. The activities in the iron ore mines consist of extraction of ore, breaking of rocks into small stones and pebbles and into fine powder, which are labour intensive usually employ migrant labour force from the surrounding districts and from other states like Andrapradesh. The owners of mines prefer migrant workers over local workers in the mines on daily wage basis. In fact, 70-80 percent, of the labours are from the dalit and tribal (sugali) communities who are brought by some middlemen/supervisors to the mine sites and one of the major source of employment of labour is the transport vehicles like trucks, lorries and tippers. It is estimated that there are more than 18,000 lorries in Bellary district and in the Sandur taluk alone there are nearly 8000 trucks and 8000 tippers which employ about 70,000 workers. However, there are at around 1.5 lakh casual workers engaged in the transportation related work the three taluks dominated for mining activities, namely, Bellary, Sandur and Hospet.

- **Workforce Participation Rate**

In a developing economy, it is natural for the magnitude of the workforce to change along with the changes in population. While workforce participation rate (WPR) in India increased from 37 percent in 1991 to 39 percent in 2001, the corresponding WPR for Karnataka was 42 percent to 45 percent respectively. But in the Bellary region, the WPR remained relatively high at 45 percent and remained unchanged during the period of the mining boom, indicating that employment generation in the district was not commensurate with the growth in population. However, during the reference period the proportion of female workers to total population in Bellary was higher than the state and national averages. Bellary was among the top ten districts in Karnataka in terms of employment of female workers as agricultural labourers which was 60 percent compared to 43 percent in the state as a whole.

Analysis of the available data had further shown that the work participation rates of the cultivators and agricultural labours had been adversely affected by the mining boom and as far as other sectors are concerned the participation rate had increased owing to variations in wage rates over the period of time. Though there has been a rise in wage rate for all categories of workers, but the rise has been relatively higher for non-agricultural labours. In the case of mining labours there are different types of complex wage employment systems. The large companies like NMDC have had permanent and daily wage labour.

- **Level of Unemployment in Bellary Region**

The level of unemployment is another indicator of measuring impact of the mining boom in the labour market and a decrease in unemployment, no doubt, is a positive indicator of the impact. In our attempt to gauge the level of unemployment, we tried to extract it from different sources, particularly from the NSS rounds. But we found that the NSS series reports only for the state and not for a region. Hence for unemployment data for the Bellary region, we had collected

it from Employment Exchanges. In order to collect such data the Live Registers was used as a proxy measure for unemployment. The details of registrants as per their qualification over the years as collected by us are provided in the table below.

Table 3: Number of Registrants in the Employment Exchange: Bellary Region

Qualifications	2004	2005	2007	2008	2009	2010
Below matriculation	11786	12823	11837	3637	2875	2608
SSLC passed	28423	27050	32410	10700	9912	7834
PUC passed	11487	9880	9142	4012	3864	5713
B.A. Graduates	2656	2497	2342	1550	1189	1339
B.SC. Graduates	1991	946	883	534	330	240
B.Com. Graduates	1627	1252	1478	1025	150	567
Total Graduates	6274	4695	4703	3109	1669	2146
Stenographers	125	86	60	53	11	61
ITI Certificate holders	5196	4718	4793	4589	4141	4529
Drivers	2348	2073	1565	1265	984	942
Bed, BpEd Degree Holders	2386	2160	1303	899	773	735
Diploma Holders	1119	1163	924	771	670	691
C. P. Ed, TCH & Nursery Trained	NA	2075	1153	787	623	425
Typists	NA	1642	1001	801	457	453
Others	NA	NA	NA	NA	510	520
Total	74759	68365	57054	30633	26345	26657

Source: Our Own Source

Examination of the figures shows that the number of registrants have decreased significantly between 2004 to 2010, with maximum fall in both category of SSLC passed and below matriculate. This implies that mining boom has a positive impact on the labour market. But it can be noted that the total unemployment had marginally increasing in 2010, may be due to the mining restrictions imposed by the government as well as by the Judiciary.

- **Level of Migration in Bellary**

As government documents on migration from and into Bellary were not available, we made use of the results of the sample survey conducted by the UNDP in Bellary (UNDP, 2008). From the survey it was found out that the half of the respondents were illiterate and are employed in unskilled works. One-fifth of the surveyed migrants stated that they had migrated from other states, and a little more than one-third from other taluk or districts of Karnataka. Indeed, Hospet taluk had the highest proportion (58 percent) of migrants coming from Bellary taluk itself. As regards the profile of job opportunities, 34% of the migrant worker respondents and 20% of the family members informed that they are working in the mining sector. Among them while 28 % stated that they were daily wage employees, 16% on contract wages and 26 % work on a piece-rate. Over 60 percent of the migrants had migrated for more than two years before the survey, and they had faced no problems in finding a job. The migrant survey further revealed that there was an incentive to migrate to Bellary since getting jobs was not a problem. The socio-economic profile of the migrants indicated that they are from lower caste and illiterates and they had brought their families with them. And a significant percentage of the migrants and their families have ended up in the mining sector, and also work in mining-related sectors like transportation and steel. This further corroborates that mining boom had a positive effect on employment.

From various other sources, it was also ascertained that Bellary had seen an explosion in informal and

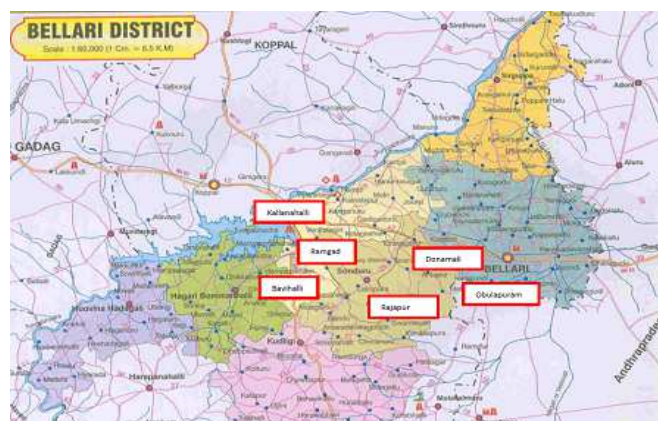
unorganized sector employment including employment of women and children. But migrant workers have been the mainstay of the employment growth during the boom period. However, growth of employment has been slow, and most of the employment generated has been in the informal/unorganised sectors linked up with mines and mineral activities including sectors like transportation and construction.

HOUSEHOLD IMPACT ASSESSMENT FROM THE FIELD SURVEY

As discussed earlier the iron ore mining belt of Bellary region of Karnataka was selected for the study because of concentration of iron ore mining activity. This region which is spread in three taluks of Bellary, Hospet and Sandur of Bellary district of Karnataka and a part of Anathpur district of Andhra Pradesh occupies an important place in the mineral resource map of India. This entire belt is endowed with several surface iron ore and manganese ore mines of varying qualities. Annual production of iron ore from different mines is varying from meagre production level at small mines to few million tonnes at big mines. Lease areas of different mines are also varying from less than hundred hectares to more than thousand hectares. In the entire area different clusters of mines are located depending on deposits of iron ore below the surface.

In the above mentioned sections we have examined the regional level impact of the mining boom, however, to verify those impacts at the micro level of the households, we had undertaken a primary survey of selected households of few villages drawn from from each taluk of Bellary–Hospet–Sandur mining belt. The villages and households from each taluk were chosen on the basis of intensity of mining activities, number of mines, distance to mines and area of mining. Accordingly, we selected six sample villages systematically to ensure sufficient variation and representation of the diverse characteristics of the entire mining belt. As such two villages were chosen from Hospet taluk, namely, Kallanahalli and Rajapura, three from Sandur in which two villages, viz., Bavihalli and Ramgad near private mines and one village Donamali nearer to the government owned mine of NMDC. The Bellary iron ore belt, though located in Karnataka, crosses the state border and spreads in 200 hectares into Anantapur region of Andhra Pradesh. But this deposit lies in the Bellary reserve forest. So we selected one village, Obulapuram from that area as this comes under the iron ore belt and also shares the border of Bellary and Anantpur.

The sample villages were selected systematically to ensure sufficient variation and representation of the mining area. Locations of the villages selected for primary data collection are shown in Figure 4.



Source: Bellary District Website

Figure 4: Location of Villages Selected for the Study in the Bellary Map

From among the selected six villages, 50 households from near the mines in Bellary- Andrapradesh border, 30 households near the government owned mine of Sandur, 35 each from the villages near the private mines of Sandur and 50 households each from the households near the private mines in Hospet were selected for primary survey. Thereby our primary survey had covered 250 households and the details of villages and households are given in table below.

Table 4: Details of the Villages and Households Selected for Interview

Name of the Village	Development Block (Taluk)	Region/State	Number of Households	Sample Households	Area of Village (ha)	No of Mines
Obulapuram	D.Hirehal Mandal	Anantapur/ Andhra Pradesh	538	50	2,025	6
Kallahalli	Hospet	Bellary/Karnataka	234	50	1,230	38
Rajapura	Hospet	Bellary/Karnataka	121	50	451	27
Bhavihalli (Sushilanagar)	Sandur	Bellary/Karnataka	645	35	473	19
Donamail	Sandur	Bellary/Karnataka	1311	30	128	7
Ramgad	Sandur	Bellary/Karnataka	111	35	106	18
Total			2960	250	4413	115

With a view to familiarise ourselves with the local environment, the socio economic details and baseline information on each village were collected from ‘Samanya Mahiti’ website of government of Karnataka. We also utilised some village level secondary data, such as, land use patterns, basic amenities available and location of mines from the Environmental Impact Assessment (EIA) reports submitted by the mine owners to Ministry of Environment and Forests (MoEF) for environmental clearance. To add to it, some village level secondary data were collected from revenue offices, Panchayat office, websites and government censuses. With the help of those information, we selected our sample households for direct interview by adopting a random sampling approach.

The household level data were collected by canvassing a detailed questionnaire comprising of 12 sections 135 questions covering information on demographic profiles of households, their socio economic status, household’s earnings from traditional sources, as well as the income, expenditure and asset possessions of the households. Moreover, respondent’s perception regarding the impact of mines on the local environment in terms of health effects and socio political dimensions were collected in course of our interview. Even some open ended questions were asked to find out their opinions and issues regarding effects of mining on their livelihood and mitigating measures undertaken by the miners to contain their problems. In order to undertake a retrofit analysis, household’s income, expenditure, and assets particulars were collected over 3 periods of time, i.e., before boom, during boom and post boom. The household survey was conducted during June- July, 2011 and to understand the local language we used a translator. With the help of the primary data collected, the households were divided according to their main occupations, viz., cultivators, agricultural labour, mining labour, services related to mining, and others. The number of households covered by our survey was 35, 48, 52, 77 and 35 respectively.

An examination of the households covered in each category shows that more than 50% of the households are engaged in mining and its related activities either as labour or rendering services for mining activities. It was revealed that 17 households had shifted from the agricultural labour to mining labour because of higher wage rate in mining. In spite of the mining boom, more than 15 % of the households are still engaged in farming as cultivators. In order to compare the income, savings, expenditure, assets owned patterns and the shift of labourers of the households, a cross comparison was

undertaken among the cultivators, agricultural labours, mining labours, persons engaged in service sector and the other workers across three periods, namely, before mining, during the boom period and the recent periods.

- **Monthly Income Patterns of the Households:**

After compilation of the primary data, we have drawn the trend in growth of monthly income of the households according to their professions, which are given in the following table.

Table 5: Monthly Income of Households by their Occupation (Figures in Rupees)

Category of Households	Before Boom	During Boom	Post Boom
Cultivators (CU)	5512	6337	6826
Agricultural labourers (AL)	2740	3281	2906
Mining labourers (ML)	2406	3632	1985
Service related to mining (SM)	3269	4922	2992
Others (OT)	3603	4441	3985

A cross examination of income of households according to their occupation when compared over the three reference periods has revealed that the monthly income of all categories had gone up during the boom period with the maximum gain for the mining labour and those engaged in services related to mining. Their monthly income had gone up by more than 50% due to the boom. Even all other categories like cultivators, agricultural labours and others had gained in terms of monthly income by 15%, 19.7% and 23.2% respectively during the boom period. This trend re-establishes the three speed growth model in operation in the Bellary region. However, after the boom period, the monthly income of all categories other than the cultivators has gone down. While the income of the cultivators has gone up by 8% in the post boom period, the maximum fall of 45% has been observed for mining labour, followed by 35% decline for the service related group of workers. Hence, it is established that those who had reaped maximum benefits of mining boom are those who are adversely affected in the post boom period.

- **Monthly Expenditure Patterns of the Households:**

After analysis of the income level of the households according to the profession over time, we have examined the pattern of consumption expenditures of the households over time in terms of expenditure on major items like food (F), medical expenses (M), expenses for education (E), expenses clothing (C) and electricity (EL). The details of the results are given in the table below.

Table 6: Monthly Expenditure Patterns of the Households over time (Figures in Rupees)

Cat. of	Before Boom					During Boom					Post-Boom Period				
	F	M	E	C	EL	F	M	E	C	EL	F	M	E	C	EL
HH	1586	240	744	263	161	1823	240	744	395	187	1851	240	784	282	193
CU	1586	240	744	263	161	1823	240	744	395	187	1851	240	784	282	193
AL	1067	122	274	171	94	1169	122	274	175	95	1138	122	274	171	95
ML	566	181	250	106	102	1004	181	350	162	95	587	169	175	101	93
SM	799	169	521	171	179	1225	166	916	197	154	878	155	876	208	102
OT	1203	183	345	185	109	1500	179	310	206	120	1370	179	310	188	118
T	5221	895	2134	896	645	6721	888	2594	1135	651	5824	865	2419	950	601

Source: Our Calculations from Primary Source

Analysis of the expenditure patterns of the households reveals that all the groups had improved their expenditure patterns owing to the mining boom and each group had spent more on food items followed by education of their children. But in the post boom period all the categories other than cultivators have faced a decline in their expenditure due to loss of

their income. Thus, their standard of living has gone down. In fact, a maximum loss is noted in case of the mining labour class and the service related mining workers.

It is also observed that most of the labour groups are spending major part of their income on food items and it reconfirms the common trend of the subsistence living style of the agricultural labourers all over the developing countries.

- **Asset structures of the Households**

In addition to income and expenditure trends of the sample households, we have computed another indicator of the standard of living of the people, viz., the tangible asset structures. The changes in the asset structure of different categories of households in terms of possession of transport vehicles like cycles, motor cycle/motor car; and electronic items like fans, TV, Telephone including cell phone are shown in table 7 for different reference periods.

Table 7: Number of Assets Possessed by the Households Before, During and Post-Boom Period

Assets	Before Boom					During Boom					Post-Boom Period				
	Vehicle		Electronic Items			Vehicle		Electronic Items			Vehicle		Electronic Items		
	Cycle	MC/Car	Fan	TV	Cell/Tel	Cycle	MC/Car	Fan	TV	Cell/Tel	Cycle	MC/Car	Fan	TV	Cell/Tel
Cultivators	24	12	29	7	5	20	25	30	22	18	19	20	31	27	19
Agricultural labourers	29	0	1	0	0	31	2	23	5	14	31	2	21	7	12
Mining Labourers	11	2	4	2	5	14	8	14	6	11	14	8	14	6	13
Service related to Mining	13	18	21	19	32	15	43	51	37	79	11	40	51	34	35
Others	17	4	9	4	9	23	13	26	10	20	23	13	26	11	23
Total	94	36	64	32	51	103	91	144	80	142	98	83	143	85	102

Source: Primary Survey Results

An examination of the above figures indicate that the asset structures of all categories of households had increased owing to boom with a significant increase in the electronic items like fans, television and cell phones implying that their standard of living had gone up. But the changes had been marginal rise for the agricultural labours and the fall is also marginal in the post boom period. On the other hand, the households pursuing service related to mining had gained the maximum in terms of acquisition of motor vehicles as well as electronic goods. The decline is also higher for this group in the post boom period. The cultivators had gained marginally in terms their acquisition of motor vehicles and electronic goods like TV and cell phones. There is hardly any change in the post boom period for them.

CONCLUDING OBSERVATIONS AND POLICY IMPLICATIONS

Our study has established that the mining boom had resulted in structural changes in a backward region like Bellary. There had been a dynamic change in the labour market whereby the mining labours and labours working in services related to mining had gained the maximum in terms of their income, consumption and possession of material assets. Sectoral linkages and the resultant labour mobility had improved. Our study has identified positive growth impulses emerging among sectors which are instrumental to foster and sustain the growth momentum. In tune with the structural changes of our country as well as that of Karnataka, it is established that the economy of India and Bellary region have experienced a sectoral shift in share of Gross Domestic Product (GDP) from agriculture to industry and then to services

due to the recent mining boom, of course with some changes. The results have shown that though the tertiary sector contributed more to the Net District Domestic Product of Bellary, but with the mining boom primary sector and the secondary sector also started contributing to it and pushed Bellary into a three speed economic growth path. This is different from the state and national trend where the share of primary sector is declining with a stagnant manufacturing sector and a rising service sector. In fact, analysis of both the regional and household data have shown that in Bellary, all three sectors have improved in the wake of the mining boom and have substantiated the three speed growth models as observed in developed economy like Australia and Canada.

However, with the mining boom, the workforce in the primary sector has lost its importance and their position being enjoyed by the secondary and tertiary sector workforce. Our results also show that like any mining boom economy, the overall wages of Bellary have increased and the most adversely affected sections were the farmers and agricultural labourers. The study of the labour market of Bellary shows dynamic growth in employment in mines, as well as in ancillary activities like transport, repair works, construction, hotels and restaurants, trade, communication etc. It is observed that the increased export of iron ore due to the mining boom has strengthened the primary sector of Bellary. The iron ore based industries popped during the boom has strengthened the secondary sector and has also accelerated the growth of ancillary sectors that provided more employment opportunities for the workers. Contrary to the trend of sectoral transformation in other regions of the country, where service sector has grown at the cost of primary and secondary sector, our study of the Bellary region have established that all three sectors are growing simultaneously after the mining boom period, which is a confirmation of the growth trend in few developed countries with a strong mines and mineral base.

The results also reveal that the increase or decrease in net district domestic product has had not affected any of the three sectors. Where as it is the change in the primary sector which affects all the sectors significantly and secondary sector is the next influential one. So the investments in these sectors should be promoted for sustain the three speed economic growth enjoyed by the region. This implies that economic benefits created by mining can be sustained indefinitely through appropriate investment, which reinstates the Hicks-Page-Hartwick-Solow rule of sustainability. Further, it is noted that Bellary region has had seen an explosion in informal and unorganized sector employment including employment of women and children. But the migrant workers have been the mainstay of the employment growth during the boom period. However, growth of employment has been slow, and most of the employment generated has been in the informal/unorganised sectors linked up with mines and mineral activities including sectors like transportation and construction.

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